by Lawrence Bridge and Vito Natrella ☆

Capital Expenditures by Nonmanufacturing Industries

RECENT studies of investment in productive facilities have noted the broad industrial base of the strong postwar demand for goods. A detailed industry breakdown of manufacturers' capital outlays permitting analysis of the industrial structure of fixed investment within manufacturing was presented for the first time in a SURVEY article last December. The present article extends the new detail to include plant and equipment expenditures by nonmanufacturing industries and appraises the contribution of these sectors to the overall level of capital goods demand.

The new manufacturing and nonmanufacturing series not only make available more detail than previously, but also are conceptually more comprehensive in coverage and utilize all the available data for purposes of estimation.

The revised estimates of capital goods outlays by major nonmanufacturing industries are similar in scope and concept to those for manufacturing industries. In conjunction with the estimates of manufacturers' outlays, the new series make available a completely revised aggregate of private nonagricultural business investment in new plant and equipment. The regularly conducted joint quarterly surveys by the Office of Business Economics and the Securities and Exchange Commission will utilize these data in extrapolating actual and prospective fixed investment by nonagricultural industries. The new series cover expenditures from 1945 to date, and provide estimates for the year 1939 as a prewar point of reference. This article also presents for the first time seasonally adjusted quarterly estimates.

New and old series

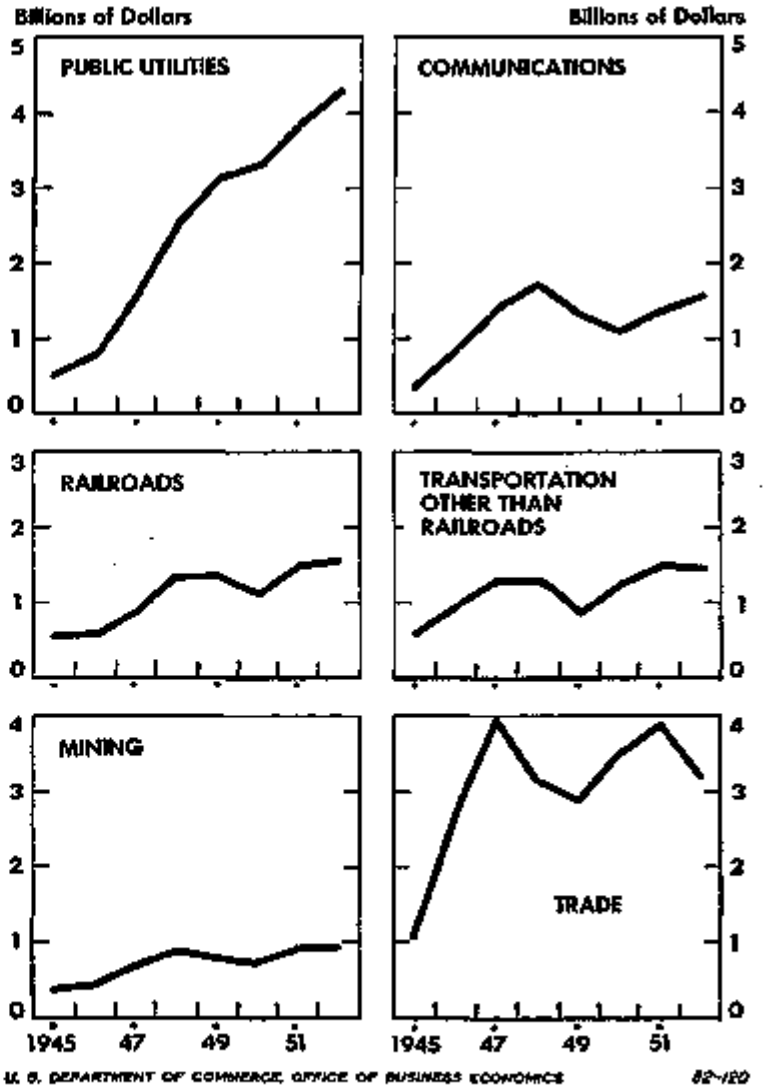
There are many conceptual and statistical differences between the new and old estimates of outlays by nonmanufacturing industries.

In the first place, the new estimates for corporations utilize the industrial classification and are adjusted to universe on the basis of the gross capital assets (or, in the case of trade and service, gross sales and receipts) of corporations as reported to the Bureau of Internal Revenue during the 1948 tax year. Estimates for noncorporate business are adjusted to universe using sales of proprietorships and partnerships as reported to B. I. R. In the old series, mining was adjusted to 1940 corporate tax returns, estimates for transportation, communications and public utilities utilized various governmental and private sources of data, while benchmark data for all other nonmanufacturing industries were based on "commodity-flow" or adjusted production estimates.

In contrast, the new series is based entirely on company expenditures data adjusted to universe estimates by the Bureau of Internal Revenue statistics.

A second difference is due to the utilization by the new series of the mandatory annual reports of all corporations registered with the Securities and Exchange Commission rather than the somewhat smaller number of companies reporting in the quarterly survey. Third, the present estimates make use of external sources of data where supplementation of the sample appears warranted. This is more fully discussed in the technical notes. Fourth, the new series is adjusted for biases resulting from changes in the number of operating businesses—and generally is based on more refined estimating procedures.

Investment Trends in Nonmanufacturing Industries



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The present estimates are higher throughout the postwar years than the heretofore published data. An industry-by-industry comparison indicates little adjustment in the estimates of capital outlays by the railroads, public utilities, mining, and communications.

Thus, the upward revision is concentrated in transportation other than railroads (more particularly in motor transportation) and in the commercial and other group. These are the areas for which no adequate data previously existed. The old estimates were based on an assumption that these industries purchased only office equipment and fixtures, professional and scientific instruments, aircraft, ships, and motortrucks. Plant expenditures utilized estimates (based on Dodge Corporation statistics) of commercial and miscellaneous building.

Presently available data show the old series to be deficient in coverage—particularly in the exclusion of expenditures for business passenger cars. This item accounts for the bulk of the substantial upward revision of the commercial and other group in 1948.

Definition and scope

The present series excludes several important sectors of investment; agriculture, government, nonprofit institutions, professionals, and residential construction. Thus, the series covers investment by private nonagricultural profit-seeking enterprises. The exclusion of professionals, an exception to this definition, was dictated by the almost complete lack of data in this area. With these exceptions, the present OBE–SEC series covers all expenditures for new plant and equipment by business.

Table 1.—Expenditures on New Plant and Equipment by United States Business, 1939, 1945–51[1]

[Millions of dollars]

	1939	1945	1946	1947	1948	1949	1950	1951
All industries	5,512	8,632	16,543	20,612	22,059	19,283	20,605	26,632
Manufacturing	1,943	3,953	6,790	8,709	9,134	7,149	7,491	11,130
Nonmanufacturing	3,569	4,709	9,753	11,903	12,925	12,136	13,114	15,502
Mining	326	383	427	691	882	792	707	911
Railroads	289	548	583	849	1,319	1,332	1,111	1,474
Transportation other than rail	365	574	923	1,295	1,285	887	1,212	1,493
Communications	302	321	517	1,399	1,742	1,320	1,104	1,344
Public utilities	520	505	792	1,539	2,643	3,126	3,300	3,855
Trade	1,392	1,074	2,894	3,857	3,156	2,874	3,404	3,896
All other[2]	834	1,304	1,823	2,135	1,896	1,705	2,177	2,230

[1] Data exclude expenditures of agricultural business and outlays charged to current account.
[2] Includes service, construction and finance.

Source: U. S. Department of Commerce, Office of Business Economics, and the Securities and Exchange Commission.

The new estimates are based on expenditures for plant and for types of equipment for which the reporting company normally maintains depreciation accounts—and explicitly exclude capital outlays charged to current account. In this respect, and in the classification by purchaser, they differ from estimates obtained from production or shipments data (the commodity-flow approach) which measures expenditures by type of capital good rather than by ownership. The approach used in the present series, it should be noted, is the only means of obtaining actual and prospective capital expenditures data by industry.

Postwar Investment Trends

A very substantial backlog of capital goods demand generally existed among nonmanufacturing industries at the end of World War II. While their facilities reconversion problems were quite small as compared to those of many manufacturing industries, their plants and equipment suffered from wartime under-maintenance. In addition, the peacetime demand for their products and services was quite high.

Largely as a result of the latter factor, but also reflecting the wartime influence in keeping the business population at depressed levels, an abnormally large number of new business enterprises were initiated during the early postwar years. The fixed investment needs of these firms were superimposed on the existing large volume of demand by established firms. In some industries—particularly in trade, services, and construction—the initial capital investment by new firms in the 1945–48 period accounted for a very significant part of total plant and equipment expenditures in those areas.

The situation among the railroads at the end of the war differed quite markedly from that of most other major industries. The diversion of traffic from tanker and collier due to the submarine menace, and from motor trucks and passenger cars because of rubber and gasoline shortages, as well as the movement and support of troops in a two-front war, placed a disproportionate share of the war transport burden on the railroads. As a result, the rails, unlike most other major private sectors, maintained through the war years their immediate prewar rates of capital goods expenditures.

At the end of the war the rails were faced with the loss of war-induced traffic as well as the resumption of the secular trend toward diversion of traffic to passenger cars and other private carriers. The postwar capital goods demand by the railroads was nevertheless strong. The rails thus embarked on a large program of modernizing their road and passenger car equipment and substituting more efficient diesel-electric locomotives for steam-driven equipment.

The early postwar years

As a result of these factors, as well as the rapid increase in capital goods costs, the early postwar years were characterized by rapidly rising capital goods outlays by all major industries. Total expenditures by the nonmanufacturing group in 1948 totaled $13 billion, as compared to less than $5 billion in 1945, and about $3.5 billion in 1939 (table 1). In physical volume terms, additions to productive capacity were about the same in 1939 and 1945 and were more than twice as high in 1948 than in either of the earlier years.

As compared to total fixed investment outlays in manufacturing, the expansion during the early postwar years was greater in the nonmanufacturing group—so that the latter's proportion to total nonagricultural business capital outlays rose from just under 55 percent in 1945 to almost 60 percent in 1948. In 1939, however, this proportion had been 66 percent.

Every major nonmanufacturing industry and each size group of firms contributed to the increase in expenditures from 1945 to 1948. Most striking were 1948 rates of dollar spending five times as much as in 1945 by public utilities (proportionately even higher among gas companies) and communications companies. Construction, nonrail, transportation, retail and wholesale trade and finance reached annual peaks in capital goods outlays in 1947 and cut back their investment in 1948.

All of the latter industries continued to reduce their spending throughout 1949. These declines and those also occurring in mining and communications more than offset the moderate continuing increases in investment by both gas and electric companies, the railroads and service firms. Total nonmanufacturing capital outlays fell about 5 percent from 1948 to 1949—considerably less, both in relative and

Table 2.—Expenditures for New Plant and Equipment by United States Business, Quarterly, 1947–52 [1]

[Millions of dollars]

	1947				1948				1949				1950				1951				1952		
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II [2]	III [2]
All industries	4,332	5,142	5,209	5,368	5,006	5,501	5,415	6,141	4,719	4,978	4,472	4,227	4,188	4,844	5,251	6,122	5,535	6,865	6,715	7,421	6,228	7,194	6,570
Manufacturing	1,878	2,181	2,348	2,495	2,301	2,310	2,164	2,458	1,855	1,674	1,655	1,705	1,444	1,714	1,859	2,474	2,163	2,802	2,841	3,335	2,742	3,251	3,097
Mining	137	163	176	215	183	216	219	265	215	204	182	191	167	173	171	197	189	241	236	244	208	238	245
Railroads	155	213	222	200	272	312	322	413	361	381	310	300	229	291	288	310	294	394	354	422	352	391	375
Transportation, other than rail	276	360	317	345	291	347	312	336	217	224	232	211	259	303	321	329	366	420	372	344	361	417	343
Public utilities	295	356	416	501	408	513	542	591	526	774	797	918	540	745	852	1,073	769	936	1,042	1,117	847	1,066	1,171
Commercial and other [3]	1,684	1,870	1,926	2,012	1,600	1,703	1,756	1,937	1,426	1,549	1,494	1,542	1,455	1,618	1,760	1,939	1,763	1,872	1,870	1,949	1,706	1,782	1,649
	Seasonally Adjusted at Annual Rates																						
	[Billions of dollars]																						
All industries	19.49	20.31	21.02	21.33	22.25	21.99	21.94	22.26	21.07	18.66	18.55	17.61	16.42	18.23	21.04	23.39	24.39	26.40	27.67	27.30	27.43	27.32	27.69
Manufacturing	8.24	8.62	8.88	9.01	9.65	9.42	8.94	8.88	8.13	7.40	6.84	6.38	6.24	6.78	7.66	8.92	9.46	11.03	11.72	12.02	12.04	12.24	12.74
Mining	.59	.66	.72	.77	.79	.87	.90	.96	.82	.82	.78	.70	.73	.68	.67	.75	.82	.95	.93	.93	.93	.94	.96
Railroads	.69	.82	.93	1.09	1.21	1.21	1.33	1.50	1.60	1.48	1.28	1.09	.96	1.13	1.19	1.15	1.28	1.53	1.46	1.50	1.57	1.47	1.47
Transportation, other than rail	1.20	1.53	1.27	1.29	1.37	1.29	1.25	1.25	1.02	.84	.95	.79	1.06	1.08	1.30	1.43	1.45	1.50	1.50	1.50	1.47	1.46	1.30
Public utilities	1.30	1.44	1.66	1.73	2.13	2.48	2.64	2.89	3.03	3.13	3.16	3.16	3.12	3.07	3.24	3.70	3.70	3.86	3.97	3.85	4.14	4.18	4.46
Commercial and other [3]	7.41	7.44	7.56	7.44	7.16	6.82	6.98	6.84	6.36	6.01	5.89	5.89	6.21	6.49	6.97	7.35	7.67	7.48	7.49	7.40	7.27	7.02	6.75

[1] Data exclude expenditures of agricultural business and outlays charged to current account.

[2] Data for the second and third quarters of 1952 are based on anticipated expenditures reported by business in late April and May 1952.

[3] Data include trade, service, communication, construction.

Sources: U. S. Department of Commerce, Office of Business Economics, and Securities Exchange Commission.

absolute terms, than the drop in manufacturers' capital expenditures.

The general decline in business fixed investment in 1949 also occurred in almost all other types of private gross domestic investment: inventories, agricultural plant and equipment, and residential construction. Gross private investment and business fixed investment expenditures were again moving up by the end of 1949.

Post-Korean trends in capital expenditures

The tempo of capital goods spending increased rapidly after the onset of Korean hostilities. Investment by every major industry group expanded in the face of abnormally large demand by both consumers and producers and in view of anticipated price rises and material shortages. The industrial pervasiveness of rising outlays lasted about one year and brought the seasonally adjusted annual rate of total nonmanufacturing capital investment in the first half of 1951 to almost one-fourth above the corresponding period of the previous year (table 2). The physical volume increase in expenditures for productive facilities in this period was about 10 percent, with even greater relative expansion in transportation, mining and construction.

In early 1951, plant and equipment outlays by most industries with little participation in the mobilization effort—trade, services and finance—turned down. This reduction in outlays reflected the easing in consumer demand and governmental construction limitations and materials allocations.

The decline in these areas was offset through the first quarter of 1952 by the continuation of the expansion by mining, public utilities, the rails and communications companies. These groups not only felt the pressure of rising military demand upon their capacity but also were being encouraged to expand their capacity by Federal aids through the rapid amortization and other programs. Approved investment under certificates of necessity through mid-1952 amounted to $3.3 billion for public utility companies (primarily in electric power), $2.7 billion for the rails, and $1.3 billion each for nonrail transport and mining companies.

The most recent survey of capital spending intentions indicate that electric power companies are planning substantial expansion in their rates of fixed investment during the third quarter. Mining companies expect a moderate increase in spending, other defense-related industries are expected to maintain first half of 1952 rates of expenditures, while further declines are scheduled during the third quarter by commercial and other industries.

Total outlays by nonmanufacturing industries as a whole in the third quarter of 1952 are expected to be somewhat below first half rates, while manufacturers had scheduled third quarter additions to productive facilities moderately above the first six months of this year.

Relation to Fixed Assets

In the earlier article on capital investment by manufacturing industries it was indicated that some insight into the size of the postwar expansion was afforded by comparison with the book value of corporate gross capital assets at the end of 1945. It was pointed out, on the basis of admittedly rough adjustment for the different prices reflected in the book value of capital assets and in postwar expenditures, that approximately two-fifths of the gross stock of corporate manufacturers' fixed capital at the end of 1951 was purchased in the six years 1946 through 1951.

The new series makes possible similar approximations for nonmanufacturing corporations—although subject to the same substantial margin of error. Capital assets data are not available for noncorporate firms which accounted in 1948 for somewhat less than one-fourth of total nonmanufacturing plant and equipment expenditures.

Total gross capital assets (excluding land) of all nonmanufacturing corporations totaled almost $86 billion at the end of 1945 as compared to total capital outlays by these companies in the 1946–51 period of almost $54 billion. After crude price adjustment to place both figures on a current replacement cost basis, and allowing for the retirement of facilities in the postwar period, it is estimated that approximately 30 percent of the gross stock of nonmanufacturing fixed capital at the end of last year was less than six years old.

As noted above, the comparable figure for manufacturing corporations is 40 percent—and for manufacturing and nonmanufacturing corporations combined is 35 percent. If present programs for this year are realized, about two-fifths of all corporate productive facilities at the end of 1952 will have been added in the seven years 1946–52. Manufacturing and nonmanufacturing will have added 45 and 35 percent, respectively.

Table 3.—Nonmanufacturing Expenditures for New Plant and Equipment, 1948

[Millions of dollars]

Industry	Amount
Total nonmanufacturing	12,025
Corporate	9,573
Noncorporate	2,052
Mining	833
Nonferrous metals	45
Iron and other metals	28
Petroleum and gas extraction	555
Coal and other mining	255
Railroads	1,319
Transportation other than rail	1,286
Oil pipeline	128
Air	101
Water	48
Transit and motor	1,005
Communication	1,742
Public utilities	2,543
Electric	1,993
Gas	670
Other	70
Trade	3,258
Wholesale	554
Retail	2,704
Food stores	489
General merchandising	307
Apparel and accessories	113
Drug stores	77
Other retail	1,009
All other	1,996
Service	1,038
Construction	298
Finance	660

Sources: Department of Commerce, Office of Business Economics, and Securities and Exchange Commission.

These data indicate the tremendous increase in the nation's capacity that has taken place since the end of the war. Manufacturers will by the end of 1952 have added somewhat under 50 percent to their 1945 productive capacity.

It is conceptually difficult to define capacity in some nonmanufacturing sectors. However, nonmanufacturing gross fixed assets at the end of this year are expected to be 25 percent higher in real terms than at the end of 1945. Examination of the data on corporate fixed assets and postwar capital outlays indicates that the capacity increases have not been uniform among nonmanufacturing industries. Substantial increases appear to have taken place in public utilities, nonrail transportation and communications.

Composition of 1948 Capital Expenditures

Table 3 gives a fairly detailed breakdown of nonmanufacturing capital expenditures, by legal form and industry in 1948, the benchmark year for this series. Most of these data are presented for the first time.

Nonmanufacturing plant and equipment expenditures in 1948 totaled $13 billion, as compared with $9 billion for manufacturers. Thus the former group accounted for almost three-fifths of total business expenditures of $22 billion, as defined in the joint Office of Business Economics-Securities and Exchange Commission series. Allowing for sectors outside the scope of this series—agriculture with $4.5 billion of fixed investment and professionals and institutions with outlays of about $1.5 billion—capital additions by manufacturing business (as defined here) accounted for more than two-fifths of all plant and equipment outlays by private enterprises in 1948. For all private fixed investment, including residential construction, the nonmanufacturing portion was down to somewhat over one-third.

Investment by legal form

Corporations expended $10 billion, or over 75 percent of total outlays by nonmanufacturing industries. Two-thirds of the corporate investment occurred in public utilities, transportation and communications, and an additional 10 percent in retail trade. Noncorporate retailers accounted for about one-half of all noncorporate nonmanufacturing capital outlays, services for an additional one-fifth and nonrail transport (primarily motor) for 10 percent.

Investment by industry

On a broad industry classification of the nonmanufacturing sector, retail trade and public utilities had the largest volume of capital expenditures in 1948—their expenditures of $2.5 billion each accounting in each instance for about one-fifth of aggregate nonmanufacturing outlays. Electric power companies (including mixed electric and gas interests) alone made 15 percent of total outlays.[1]

Within retail trade, the food group was the most important purchaser of plant and equipment, followed by general merchandise stores. Communications was the third largest nonmanufacturing industry with about one-eight of total nonmanufacturing outlays, while the railroads and nonrail transportation each spent about 10 percent of the total.

The capacity of the last two industries is worthy of note, reflecting the strong secular growth in nonrail transport facilities—particularly in motor trucks and buses where additions to plant and equipment in 1948 were two-thirds as large as those made by the railroads.

The importance of other industries is also shown in the table. In the case of mining, it should be noted that a significant proportion of capital outlays for mining facilities (particularly in petroleum, iron ore and nonferrous metals) are included in manufacturing due to these series being on a company (rather than plant) basis. A somewhat smaller amount of investment in manufacturing facilities, on the other hand, is included in the present mining series.

[1] The series on electric power outlays differs from those published by the Electrical World and the Edison Electric Institute primarily in that the two latter series include municipally owned plant, while the former is confined to private companies. On the other hand, the present series, unlike the other two, includes outlays for gas facilities by mixed electric and gas companies. It is mainly for this reason that the present series on gas companies is lower than that published by the American Gas Association.

Technical Notes

As defined above, the estimates of expenditures on new plant and equipment presented here cover all private nonmanufacturing business except agriculture, professionals and individuals. The corporate segment is essentially on a Statistics of Income, 1948, base with the same degree of consolidation and the same industrial and size classification. The B. I. R. returns in these fields were generally unconsolidated while the industrial classification in most respects was similar to the latest Standard Industrial Classification.

With certain exceptions, the nonmanufacturing estimates for the years 1945-50 are derived from data on capital additions included in the annual reports required to be filed by corporations registered with the Securities and Exchange Commission. These reports, it may be noted, and those collected from nonregistered manufacturers by the Office of Business Economics were also the primary sources of information for the manufacturing estimates. The quarterly estimates of actual expenditures through the first quarter of 1952 and anticipated expenditures for the second and third quarters this year are interpolations or extrapolations generally based on quarterly figures for the more than one-half of the registered corporations cooperating in the regular quarterly survey.

For those nonmanufacturing groups which were estimated on the basis of S.E.C. registered companies the sample, in aggregate, accounted for 68 percent of corporate gross capital assets in 1948 as reported to the Bureau of Internal Revenue. As indicated in the table, however, the coverage varied considerably from industry to industry and also for subgroups within major industries. In some of the minor segments it was necessary to use an admittedly deficient sample to determine the year to year movements. In the more important areas for which sample data described above were deficient, more accurate estimates of expenditures in 1948 were possible on the basis of external data, including Census of Business information and, to a lesser extent, capital asset and depreciation data from Statistics of Income.

On the whole, however, the present series makes available reasonably accurate estimates for nonmanufacturing as a whole, and constitutes a major improvement over the previous series. The samples accounted for over 90 percent of the 1948 fixed assets in such industries as the railroads, communications, and public utilities. These industries made more than half on all corporate nonmanufacturing capital expenditures in 1948, and over two-fifths of the total including noncorporate firms.

Percentage of Corporate Gross Capital Assets Accounted for by Sample Companies, by Industries, 1948 [1]

Industry	Percent
All nonmanufacturing	68
Mining	40
Nonferrous metals	96
Iron and other metals	17
Petroleum and gas extraction	30
Coal and other mining	34
Railroads	92
Transportation other than rail	52
Air transportation	95
Pipeline [2]	78
Water [2]	23
Transit and motor transportation	49
Communications	92
Public utilities	91
Electric and mixed utilities	96
Gas	69
Other	38
Trade [2]	28
Wholesale	9
Retail	37
Food stores	28
General merchandising	84
Apparel and accessories	41
Drug stores	32
Other retail	6
All other	12
Service [2]	20
Construction	8
Finance	4

[1] Based on gross capital assets (excluding land) as reported to the Bureau of Internal Revenue for the 1948 tax year, adjusted for corporations not reporting balance sheets.
[2] The estimates for these groups were based on additional data.

Source: U. S. Department of Commerce, Office of Business Economics, and Securities and Exchange Commission.

While transportation and mining had corporate coverages of 52 percent and 40 percent, respectively, the sample was unevenly distributed so that within these groups air transportation and nonferrous metals each had samples accounting for about 95 percent of gross capital assets, as compared to 23 and 30 percent, respectively, in water transportation and petroleum and gas extraction. The industries subject to the largest margin of error are trade, with 28 percent coverage, and the "all other" group, with only 12 percent. Within trade, general merchandising was almost 85 percent covered, reflecting the high concentration in this area of the larger sized companies. Except for trade and service in 1948, no capital expenditures data were available for unincorporated business which accounted for almost 25 percent of nonmanufacturing capital expenditures in 1948. Noncorporate outlays are particularly large in trade and service.

Methodology

The methodology used in the determination of the 1948 benchmarks and the estimation of the year-to-year movements in the capital outlays by mining, communications, public utilities, construction, finance, airline and local transit companies is described below.

The universe estimates for 1948 were prepared separately for three asset size groups of corporations and for noncorporate firms within each industry. The sample data consisted of tabulations, by size, of capital additions (excluding land and used plant and equipment) and gross capital assets for practically all corporations registered with the Securities and Exchange Commission. For the year 1948, capital additions by corporations in the sample were stepped up by the ratio of universe gross capital assets to sample gross capital assets separately for each industry-size cell. Universe gross capital asset figures are from Statistics of Income, 1948, adjusted on the basis of total compiled receipts to correct for corporations not filing balance sheets. The 1948 corporate universe estimates for each industry-size cell were then carried backward and forward on the basis of the sample of registered companies.

Gross capital assets of the noncorporate universe were determined on the assumption that within similar industries the ratio of gross capital assets to sales and operating receipts was the same for both small corporations and noncorporate business. Data on the sales and operating receipts of partnerships and proprietorships available for 1947 from the Bureau of Internal Revenue were extrapolated to 1948. An estimated ratio of capital additions to gross capital assets was obtained by examination of the size differences among corporations taking into consideration the generally smaller size of noncorporate business firms. This ratio was applied to the gross capital assets of noncorporate business as determined above to arrive at estimates of noncorporate capital additions. The smaller size groups of corporations in each industry were used for the year to year trends.

Following are the procedures used for other industries:

Wholesale trade, retail trade and service. The 1948 benchmark estimates were derived for noncorporate firms and separately for registered and nonregistered corporations. Estimates for the nonregistered corporate universe were based on capital expenditures data collected from a small sample of establishments in the Post Enumeration Survey to the 1948 Census of Business. The ratio of capital additions to sales for the corporations in this sample weighted by size and industry was applied to sales and operating receipts of nonregistered corporations as reported to BIR in 1948. The capital expenditures available from all registered companies were then added to obtain total plant and equipment expenditures by corporations in each industry. The noncorporate ratio of capital additions to sales for each industry, also obtained from the Post Enumeration Survey sample, was applied to noncorporate sales in 1948 (which were derived by extrapolating sales reported by partnerships and proprietorships to BIR in 1947). The extrapolation prior to and after 1948 was based on the registered company data.

Oil pipeline. Based on data from the Interstate Commerce Commission's *Statistics of Oil Pipe Lines Companies*. The 1948 ratio of BIR gross capital assets to the investment in carrier property reported to ICC was applied to ICC figures on expenditures for new construction and improvements. The estimates for the other years were extrapolated according to the trend in the ICC series. It should be noted that the ICC series is higher than the estimates used here due to the inclusion in manufacturing and mining of some pipeline investment by major oil companies. Quarterly data were interpolated by pipeline construction figures of the Department of Commerce.

Railroads. Starting in 1947, quarterly and annual estimates for capital expenditures by Class I railroads were taken from the quarterly data collected by the I. C. C. as part of the quarterly survey conducted by the Office of Business Economics and the Securities and Exchange Commission. Prior to 1947, annual data on gross capital expenditures of Class I railroads collected by the Association of American Railroads which are on the same conceptual basis were used. Universe estimates for expenditures by other than Class I railroads were based on capital outlay data for Class II and III railroads and for lessors (from the I. C. C. Statistics of Railways) and on B. I. R. gross capital assets data.

Motor carriers. Sample data collected by the I. C. C. for Class I motor carriers served as the basis for the annual estimate of capital outlays in the motor trucking industry and in other motor vehicle transportation, using procedures similar to those for the registered sample. Figures for two large registered taxicab companies were used to supplement the I. C. C. intercity bus data. Expenditures for other taxicab companies were imputed in the blow-up to universe. Estimates of noncorporate expenditures were based on the B. I. R. 1947 partnership and proprietorship data as previously described.

Water transportation. Data on additions were built up based on Maritime Commission information on ocean-going vessels, and on registered company, I. C. C., and Army Engineers data for internal water transportation. Data for some large nonregistered shipping companies were also used.

Adjustment for business population changes

Adjustments were made where necessary in the estimates of plant and equipment outlays to correct for biases due to changes in the business population which are not reflected in confirmed sample data. Estimates of capital outlays by new trade firms in the 1946-47 period were available from surveys of capital requirements of new business conducted by the Office of Business Economics. These surveys and data on business births and deaths from the business population series of the OBE were used in deriving these adjustments.

Adjustment for seasonal variations

The seasonal factors used for correcting the actual expenditures data for changes due to seasonal fluctuations were based on the "ratio to moving average" procedure. These factors are admittedly crude since the period for which quarterly estimates are available is relatively short and has been subject to many abnormal influences. In most series, however, the seasonal variations were reasonably enough defined so that approximate factors could be determined.

Seasonal influences are especially strong in the data for the fourth quarter of the year due to the year-end auditing of the year's operations by most companies. At this time, any expenditures that may have been omitted in reports for earlier quarters of the year are included with actual fourth quarter outlays in the fourth quarter reports.

Since businessmen do not allow for this accounting adjustment in reporting anticipatory data—which, it should be noted affect not only the two anticipations for the fourth quarter, but also those for the first two quarters—nor for other less important systematic tendencies unique to expectations data, the seasonal factors determined for actual expenditures cannot be applied directly to the unadjusted anticipatory statistics.

The procedure used here in removing seasonal variations in projected capital outlays is as follows: Ratios of the seasonally adjusted actual data in a given quarter to unadjusted anticipated data for that quarter for each of the years since this survey was initiated (1945) are examined for systematic tendencies. Where these are found the median ratio is selected and applied to the unadjusted anticipated expenditures figure to derive a seasonally adjusted estimate of expected capital expenditures. It should be noted that, while this procedure is somewhat arbitrary, the use of a median eliminates unusual deviations which may be random in nature or result from significant changes in investment decisions.

1939 estimates

The 1939 estimates are somewhat less reliable than the later years and were prepared in order to provide a prewar comparison. In most industries the methods used were similar to those for 1948, utilizing registered corporation, ICC, 1939 Census and other relevant data.